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PICKWELL, GEORGE V., AND WENDY A. CULOTTA. 1980. *Pelamis, P. platurus.*

Pelamis Daudin
Pelagic or yellow-bellied sea snake

Hydrus Schneider, 1799:233 (in part). Type-species, *Hydrus hydrus* (Pallas) 1771 (=*Hydrus caspius* Schneider, 1799, =*Coluber hydrus* Pallas, 1771), by original designation. See NOMENCLATURAL HISTORY.

Hydrophis Latreille, 1801:193 (in part). No type-species designated. See NOMENCLATURAL HISTORY.

Pelamis Daudin, 1803:357 (in part). Type-species, *Pelamis bicolor* (Schneider) (=*Anguis platura* Linnaeus, 1766), by designation of Gray, 1825.

Pelamys Wagler, 1830:166. Emendation of the Greek spelling to an equivalent form.

Pelamydrus Stejneger, 1911:111. See NOMENCLATURAL HISTORY.

• CONTENT. The single species recognized is *Pelamis platurus* (Linnaeus), 1766.

• DEFINITION, DIAGNOSIS, DESCRIPTIONS, ILLUSTRATIONS, DISTRIBUTION, PERTINENT LITERATURE. See species account.

• FOSSIL RECORD. No fossils of this genus are known.

• NOMENCLATURAL HISTORY. The generic name for this snake has undergone a long and convoluted history. Schneider (1799) assigned the species *bicolor* to his genus *Hydrus*, which also contained Pallas' *Coluber hydrus* (=*Hydrus caspius* Schneider), a freshwater snake that was ultimately made the type for *Hydrus* (Stiles, 1910). Latreille (1801), evidently considering *Hydrus* too similar to *Hydra*, substituted *Hydrophis*. But shortly thereafter, Daudin (1803), considering *Hydrophis* an inappropriate name for marine snakes, substituted *Pelamis*. Why this appealed to Daudin as a name for a genus of serpents is unclear. Gray (1825) recognized the uniqueness of this animal when he designated *Anguis platura* Linnaeus the type of the monotypic genus *Pelamis*. Much later, Boulenger (1890), for unknown reasons, reinstated *Hydrus* as a monotypic genus with *A. platura* Linnaeus as the type. Following the decision of the International Commission on Zoological Nomenclature (Stiles, 1910) making *Hydrus caspius* the type of Schneider's genus *Hydrus*, Stejneger (1911) substituted *Pelamydrus* for *Hydrus* (as employed by Boulenger, 1890). Ultimately, M. Smith (1926) reinstated *Pelamis* on the grounds that it was the oldest available name. Recent authorities (McDowell, 1972; Burger and Natsuno, 1974; Cogger, 1975a, b) have continued use of the monotypic genus *Pelamis*. For discussions pertaining to various nomenclatural changes, see Stejneger (1911), Smith (1926), Smith and Taylor (1945), and Loveridge (1957).

• ETYMOLOGY. *Pelamis* is an apparently obsolete Greek noun (masculine) referring to a young tuna.

Pelamis platurus (Linnaeus)
Pelagic or yellow-bellied sea snake

Anguis platura Linnaeus, 1766:391. Type-locality and holotype unknown.

Anguis platuros Linnaeus, 1788:1122. Type-locality, "Pine-isle." Holotype unknown.

Hydrus bicolor Schneider, 1799:242. Type-locality, "Otahaitee." Holotype unknown. Account based on descriptions by Seba (1735), Vosmaer (1774), Linnaeus (1788) and Russell (1796). See NOMENCLATURAL HISTORY in genus account.

Hydrophis platura: Latreille, 1801:197. New combination. See NOMENCLATURAL HISTORY in genus account.

Pelamis bicolor: Daudin, 1803:366. New combination. See NOMENCLATURAL HISTORY in genus account.

Hydrophis pelamis Schlegel *in* Temminck and Schlegel, 1838: 90. New combination. This name appeared in Siebold's Fauna Japonica. For the correct dates of the sections from Reptilia consult Sherborn and Jentink (1895).

Hydrophis (Pelamis) bicolor: Fischer, 1856:61. Substitute name for *H. pelamis* Schlegel giving the trivial name subgeneric status.

Pelamys bicolor: Fitzinger, 1861:409. Emendation of *P. bicolor* Daudin based on the revised generic spelling of Wagler (1830).

Pelamis platurus: Stoliczka, 1870:214. New combination.

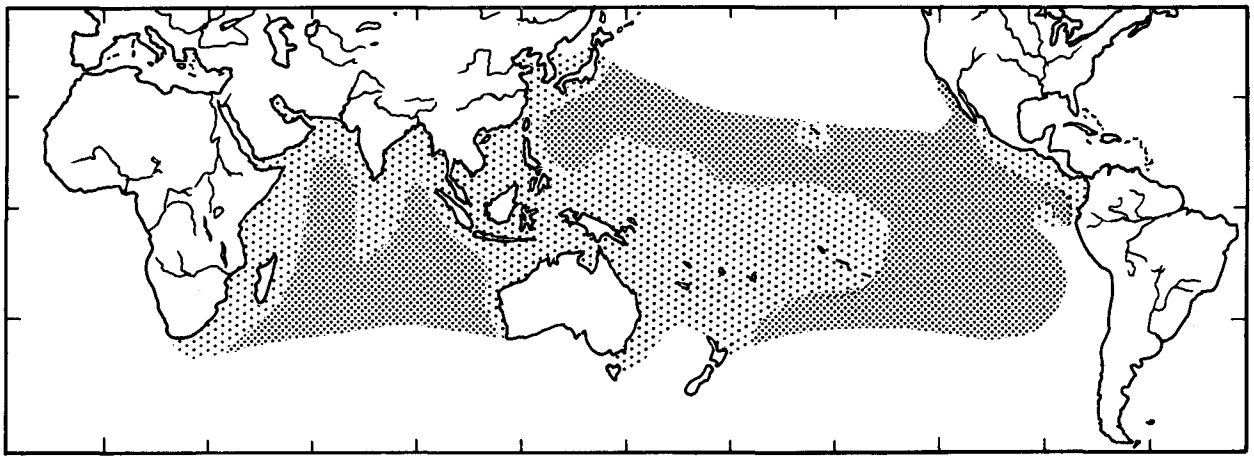
Hydrus platurus: Boulenger, 1890:397. Substitute name for *P. platurus* Stoliczka.

Pelamydrus platurus: Stejneger, 1911:111. Substitute name for *H. platurus* Boulenger.

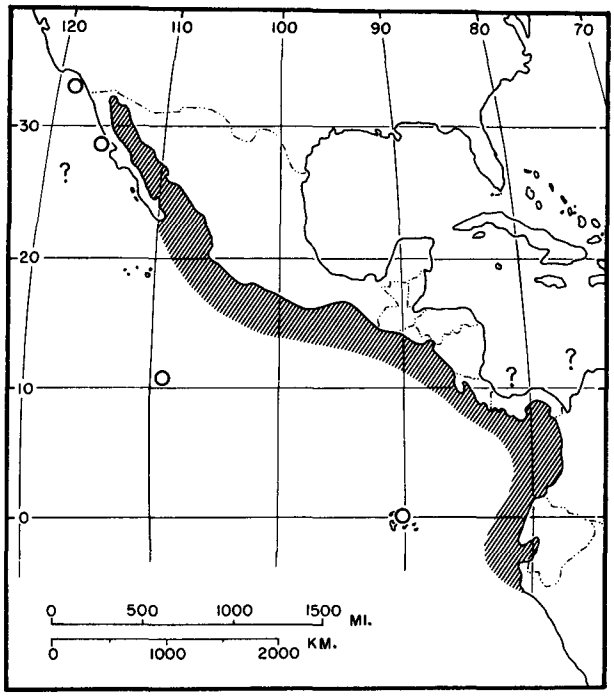
Pelamis platura: Deraniyagala, 1955:79. Emendation of species ending to conform with the original Linnaean designation.

• CONTENT. The species is monotypic.

• DEFINITION AND DIAGNOSIS. This species is venomous and live-bearing. Brood size varies generally from 2 to 8. Adults seldom exceed 75 cm total length. The largest specimens are from eastern Australian waters (maximum length 113 cm). The body is highly compressed except in gravid individuals; the ventrals small, approximately 260 to greater than 400 in long specimens, usually divided, with the groove forming a straight mid-ventral sulcus, the ventrals scarcely wider than adjacent scales. The tail is flattened like an oar; body scales are small, juxtaposed and more or less hexagonal or quadrangular, in usually 49 to 67 rows on the thickest part of the body, with about three transverse rows per vertebra at midbody, occasionally bearing tubercles in adults. The head is elongate, narrow and flattened; fangs are small, 1 to 2 mm long, about one-half of the distance from the rostrum to mid-orbit and separated from the solid maxillary teeth by a con-



MAP 1. Coarsely stippled area represents the worldwide distribution of *Pelamis* based on collected specimens and reliable sightings. Densely shaded regions are areas of probable occasional occurrence depending on ocean current conditions, sea surface temperature and season.



MAP 2. Shaded area indicates the region of common occurrence of *Pelamis* either as breeding populations or frequent strays. The distance offshore within which the snake occurs in quantity is highly variable. Circles represent remote areas where specimens have been identified; question marks indicate general localities of uncertain sightings reported in the literature, but with no exact location data or voucher specimens.

spicuous diastema. Maxillary teeth are usually 7 to 10, palatine teeth, 6 or 7. Head shields are enlarged, smooth and without tubercles or spines, nasals are in contact on the dorsal surface of the snout. There are no internasals; the nares are superior and valved. The hemipenis is narrow and only slightly bilobate with papillae at its tip; the sulcus spermaticus is forked near the tip, and the organ is covered over most of its length by small spines, each about as long as the width of the caudal scales.

Color patterns involve a sharp lateral demarcation between a black or dark brown dorsum and a bright yellow or brownish venter; in the latter case the two zones are often separated by a yellow line of varying width. The tail is generally spotted or barred with black or dark brown on yellow, no two individuals ever having exactly the same pattern. There is no evidence at present for significant ontogenetic variation in pattern or color intensity. Other sea snakes possessing black or dark brown and yellow coloration are invariably banded. There are numerous variations on the basic bicolor or tricolor scheme in *Pelamis* involving undulating patterns, additional dark lines, bars or spots, to the extreme and rare cases of specimens bearing bars the entire length of the body or lacking dark pigmentation altogether.

• DESCRIPTIONS. There is no definitive taxonomic or morphological treatment of *Pelamis*, but Wall (1921) and Smith (1926) gave useful brief accounts. Valuable early comparative studies include: buccal glands and teeth (West, 1895); olfactory glands (Katheriner, 1900); visceral anatomy (Beddard, 1904); cranial and tooth structure, cephalic musculature and glands (Phisalix, 1912, 1914); cephalic muscles (Haas, 1930). Contemporary comparative anatomical works include: venom glands (Rosenberg, 1967); hyoid (Langebartel, 1968); oral sensory systems (Burns, 1969a, b); cephalic glands (Burns and Pickwell, 1972); jaw muscles and cranial structure (McDowell, 1972); retinal morphology (Hibbard and LaVergne, 1972); eyes and other sense organs (Hibbard, 1975); lung morphology (Graham et al., 1975; Heatwole and Seymour, 1975); salt glands and integument (Dunson, 1975a, 1976); dermal scale-vertebral relationships (Voris, 1975); costocutaneous muscles (Voris and Jayne, 1976). Data on the numerous color and pattern variations were provided by Barbour (1912), Deraniyagala (1960), Visser (1967, includes observations on brood size), Kropach (1972a) and Bolaños et al. (1974).

• ILLUSTRATIONS. Black and while photographs of *Pelamis* showing pattern variations appeared in Picado (1976), Shaw (1961), Paulson (1967), Rubinoff and Kropach (1970) and Cogger (1975b). Photos of *Pelamis* undertaking knotting maneuvers appeared in Pickwell (1971). Kropach (1971a) depicted an all-yellow specimen. An excellent close-up of the integument showing scale detail was given in Dunson (1975a). Color photos of value were presented by Kuntz (1963), Halstead (1970), Dunson (1971), Pickwell (1972) and Tu (1976).

• DISTRIBUTION. *Pelamis* is the most widely distributed of all snake species, but is not known to occur in the Atlantic. Shuntov (1963) and Marinkelle (1966) reported sightings of *Pelamis* in the Caribbean, but without verification by collected specimens. The literature containing distributional data on *Pelamis* is massive. Many of the major features of its distribution were known one hundred years ago and were well documented in Günther (1864), Strauch (1873) and Peters and Doria (1878). Also see Boulenger (1896) and Werner (1900) for extensive distribution lists and Bourret (1934) for an interesting attempt to correlate Smith's (1926) varieties with geographic regions. Minton (1975) has provided the most recent comprehensive general distribution lists.

• NOMENCLATURAL HISTORY. Gray's (1842) *Pelamis ornata* has frequently been cited in the synonymy of *P. platurus*. But this designation was a substitute name for a variety of *Hydrus bicolor* described by Schlegel (*in* Temminck and Schlegel, 1838) and cannot be considered in the main line of *P. platurus* synonymy. Furthermore, Gray listed this variation immediately following his description of *P. bicolor* Daudin. Smith (1920) was of the opinion that Barbour's (1912) subspecies, *ornatus*, was insufficiently substantiated on geographic grounds alone, since other varieties occurred in the same area. But see Taylor (1950) for an opposing view. Wall (1919, 1921) was unfortunately inconsistent in his varietal designations and evidently established new synonymy lists in each new publication dealing with *P. platurus*.

Rafinesque (1817) erected the species *luteus* for an all-yellow snake in his genus, *Ophinectes*. This species was designated the type of the genus by Loveridge (1957), who believed that it and "some or all" of the remaining nine new species in the genus were but variants of *P. platurus*. This seems most unlikely since among these were included species that were entirely gray, green or bluish, with a red head, or variously spotted or banded with blue, white, red or green. For many of these it is uncertain that Rafinesque had actually seen any snake specimens at all. The first reliable mention of an all-yellow *Pelamis* was that of Voris et al. (1970) followed by the definitive description by Kropach (1971a) and corroborative observations by Tu (1976). It is not clear from the literature that either Rafinesque or Loveridge were aware of this rare color phase.

• PERTINENT LITERATURE. The definitive monograph of *Pelamis* general biology is that of Kropach (1972a). Also see Kropach (1975) for a shortened version. Briefer general treatments based on field and laboratory studies appeared by Dunson (1971) and Pickwell (1972). Viewpoints on the significance of *Pelamis* as a potential colonizer of the Caribbean and Atlantic via a possible Middle American sea level canal were given by Dunson (1971, 1975b) and opposing views by Kropach (1972b), Pickwell (1972) and Pickwell et al. (1973). The significance of ocean slicks to this snake's feeding and general life history was documented by Dunson and Ehlert (1971) and Kropach (1971b, 1972a). Prey items used by *Pelamis* were listed by Clark (1942), Klawe (1964), Visser (1967), Voris (1969, 1971) and Kropach (1971b, 1972a). Feeding behavior was described by Klauber (1935), Shaw (1962), Zeiller (1969), Kropach (1972a) and Pickwell (1972). The evident lack of predators and possible aposematic use of the snake's color and pattern were discussed by Rubinoff and Kropach (1970) and Kropach (1972a). The effects of ocean surface temperature on the survival and distribution of *Pelamis* were studied by Graham et al. (1971), Dunson and Ehlert (1971), Graham (1974a) and Hecht et al. (1974). Aspects of respiration and diving physiology were reported by Graham (1974b), Graham et al. (1975), Heatwole and Seymour (1975) and Heatwole (1978). The osmoregulatory and salt excretion capacities of *Pelamis* were well documented in the work of Dunson and colleagues (Dunson, 1975a, 1976; Dunson and Robinson, 1976).

• ETYMOLOGY. *Platurus* is a compound of the Greek *platys* (or *platos*) meaning "flat," and *oura*, "tail."

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